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IN THE UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF NORTH CAROLINA

_____

360 VIRTUAL DRONE SERVICES, et   )

al.,   )

)

                 Plaintiffs,   )

    vs.   ) Case No.

) 5:2021cv00137

ANDREW L. RITTER, et al.,   )

)

                 Defendants.   )

_____)

Videoconference deposition of ALEX ABATIE, taken

remotely in the above-captioned cause, before

Rachel F. Gard, CSR, RPR, CLR, CRR, commencing at

the hour of 3:03 p.m. Eastern Standard Time on

Wednesday, November 17, 2021.

_____

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 1    A P P E A R A N C E S (Via Videoconference):

 2

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15

16    ALSO PRESENT:

17    JOHN M. LOGSDON, Logsdon & Neece, PLLC

18

19

20

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22
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Page 3

1   I N D E X

2   WITNESS   PAGE

3   ALEX ABATIE

4   Examination by Mr. Hanna   4

5

6   E X H I B I T S

7   DEPOSITION EXHIBIT   PAGE

13

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1   (Witness sworn.)

2   WHEREUPON:

3   ALEX ABATIE,

4   called as a witness herein, having been first duly

5   sworn, was examined and testified as follows:

6   EXAMINATION

7   BY MR.HANNA:

8   Q.   Can you state your name for the record,

9   spelling your last name.

10   A.   Alex Abatie. A B, as in boy, A T, as in

11   Tom, I E, as in echo.

12   Q.   Is it pronounced Abatie?

13   A.   Correct, Abatie.

14   Q.   Mr. Abatie, my name is Doug Hannah. I

15   represent the defendants in a lawsuit filed by

16   plaintiffs 360 Virtual Drone Services, LLC, and

17   Michael Jones in Case No. 5:21cv0137 that is pending

18   in the Eastern District of North Carolina.

19   Are you familiar with that case?

20   A.   No.

21   Q.   Okay. Are you -- do you know anything

22   about the lawsuit?

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 1   A.   I know that I was asked to provide some

 2   information about mapping with drones and I had

 3   got some information, but I didn't know the court,

 4   the case, who the defendants and plaintiffs were.

 5   Q.   Okay. Do you know anything about 360

 6   Virtual Drone Services?

 7   A.   I do not.

 8   Q.   Do you know -- do you know Michael Jones?

 9   A.   I do not.

10   Q.   And who contacted you to be an expert

11   witness?

12   A.   The lawyers, Sam and James.

13   Q.   And do you understand that you're being

14   designated as an expert witness in the lawsuit

15   that's pending in federal court in the Eastern

16   District of North Carolina?

17   A.   Yes, I do.

18   Q.   Okay. We represent the defendants in this

19   case. Do you know anything about the claims that

20   were made?

21   A.   I do not.

22   Q.   I'm going to try to use the screen sharing

Page 6

 1 tool to show you an exhibit. Let me get my exhibit

 2 up first. And the first exhibit that I wanted to

 3 show you.

 4   (Deposition Exhibit Number 1

 5   marked for identification.)

 6   Q.   And do you see a copy of your report on

 7 the screen share?

 8   A.   I do.

 9   Q.   Okay. And there was -- the PDF that I had

10 sent out to the court reporter and to opposing

11 counsel is 14 pages. Does that sound right, your

12 report was 14 pages in length?

13   A.   I believe that's correct, yes.

14   Q.   All right. And I'm going to mark your

15 report as Exhibit 1 and refer to it throughout the

16 deposition as Exhibit 1 or your report. Okay?

17   A.   Yes.

18   Q.   Do you have a copy of that report in front

19 of you?

20   A.   I do. I have it on another computer here

21 on the side.

22   Q.   All right. And so from time to time

Page 7

 1   throughout the deposition, I'm going to ask you some

 2   questions about it.

 3   So just sort of to begin I think as an

 4   overview, you were asked to give certain opinions in

 5   this case, correct?

 6   A.   Correct.

 7   Q.   What opinions are you referring in this

 8   lawsuit?

 9   A.   From my understanding, what I am offering

10   is how drones can be used for mapping and 3D

11   modeling and to offer some examples on how that's

12   done.

13   Q.   So you're -- as I understand it, your

14   opinions would be essentially you're offering

15   information as to the use of drones in mapping?

16   A.   Correct.

17   Q.   Okay. And when you used the term

18   "mapping," what do you mean?

19   A.   Using drones to create certain products

20   that clients can use in their business ventures.

21   Q.   All right. What kind of products?

22   A.   Things like 3D models, point clouds,

Page 8

1   images, photographic images, orthographic maps.

2   Q.   Orthographic maps?

3   A.   Yes.

4   Q.   Okay. And so earlier you said the first

5   area of, I guess, the first opinion you would offer

6   is how drones can be used for mapping and 3D

7   modeling. Is there a difference between mapping and

8   3D modeling?

9   A.   I'm not quite sure I understand the

10   question. They're different products, I guess.

11   Q.   Well, I'm actually just going on your

12   testimony. Your testimony was that you were asked

13   to give an opinion as to how drones can be used for

14   mapping and 3D modeling; is that correct?

15   A.   Correct.

16   Q.   Okay. And so I wanted to kind of break

17   that down so that the judge or the jury could

18   understand, what is the difference between mapping

19   and 3D modeling?

20   A.   The difference is in what the final

21   result of the data collection is, and a 3D model

22   is really just a different digital file, a

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1   different way to look at the image, the

2   information that's been collected.

3   Q.   And so can you use those two terms

4   interchangeably?

5   A.   No, they're different -- they're

6   different products.

7   Q.   Okay. And so when I asked you to define

8   "mapping," you said using drones to create certain

9   products. Is that the full definition of mapping?

10   A.   I would think so. I don't know what the

11   full definition would be.

12   Q.   All right. And I'm just trying to educate

13   myself and the judge and hopefully the jury as to

14   when you're going to offer an opinion about how

15   drones can be used for mapping, what is mapping?

16   A.   It's using drones to collect information

17   that can then be output as a file that -- and

18   information that can be used to orient things in

19   space, give an overview of a site that's not

20   possible in a single photograph.

21   Q.   Anything else?

22   A.   I don't think so.

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 1        Q.   Okay.  And what qualifies you to give an

 2   opinion about mapping?

 3        A.   Well, I have done this work in my

 4   business.  And I work for a company as an

 5   instructor, and we offer classes in how to do this

 6   kind of work.

 7        Q.   All right.  And so your work experience?

 8        A.   Okay.  Yeah.

 9        Q.   Okay.  Anything else besides your work

10   experience?

11        A.   No, I don't think so.

12        Q.   And do you have any specific education in

13   mapping?

14        A.   I have some education with a company that

15   does this kind of, you know, has created software

16   to take images from drones and create some of

17   these products.

18        Q.   Which company is that?

19        A.   I have some training with PIX4D.

20        Q.   And the company that you work for

21   currently, what's the name of that company?

22        A.   That I do instruction with?
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 1        Q.    Yes, that you were -- I think you

 2   reference it in your expert report that you prepared

 3   this report through DARTDrones.  Is that the company

 4   you're referencing?

 5        A.    Correct, yes.

 6        Q.    Okay.  All right.  So how about education?

 7   Where did you go to school?

 8        A.    For my bachelor's degree I went to UCSB,

 9   University of California --

10        Q.    University of California, Santa Barbara?

11        A.    Correct.

12        Q.    And you have a BA in photography?

13        A.    Correct.

14        Q.    And do you have any other degrees?

15        A.    No.

16        Q.    And you graduated in 1997?

17        A.    Correct.

18        Q.    Where did you go to work after you

19   graduated in 1997?

20        A.    I went to work -- well, I was already

21   working at the Santa Barbara Independent.

22        Q.    Is that a newspaper?
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 1        A.    That is, yes, a newspaper.

 2        Q.    And what was your role there?

 3        A.    At the time my role there was process

 4   camera operator.

 5        Q.    And what does a process camera operator

 6   do?

 7        A.    I took photographs and sized them

 8   properly and turned them into half tones,

 9   basically dots, so they could be reproduced on the

10   press.

11        Q.    Okay.  And how long did you work at the

12   Santa Barbara Independent?

13        A.    I worked off and on at the Santa Barbara

14   Independent from 1995 until 2006.

15        Q.    Did you have -- was that a full-time job

16   in that period of time?

17        A.    Yes.  Not the whole time, but yes, near

18   the end for sure.

19        Q.    Okay.  And did you -- were you a process

20   camera operator during this period of time from 1995

21   to 2006?

22        A.    No.
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1   Q.   What did you do -- trying to get an

2   understanding of your experience.

3   A.   Okay.

4   Q.   When you graduated in '97, you were

5   working at Santa Barbara Independent as a process

6   camera operator. How long did you work as a process

7   camera operator for the Santa Barbara Independent?

8   A.   I don't remember the exact dates, but I

9   think it was maybe a year and a half, 2 years.

10   Q.   All right. Which would take us to about

11   '99. And then what did you do at that time?

12   A.   I became a -- no, it would not be '99. I

13   started in '95, so this was maybe '97. I became a

14   designer, graphic designer.

15   Q.   So when you graduated from UCSB, you

16   became a graphic designer at the Santa Barbara

17   Independent?

18   A.   Yeah. Eventually, yes.

19   Q.   And what does a graphic designer do?

20   A.   The job that I did was to lay out the

21   paper.

22   Q.   And how long were you a graphic designer

Page 14

1 at the newspaper?

2   A.   Again, I don't remember the exact dates.

3 I think maybe 3 or 4 years.

4   Q.   Okay. And so that would take us to about

5 2001/2002; is that true?

6   A.   Somewhere around there.

7   Q.   And then what did you do? Did you switch

8 jobs?

9   A.   No, I was promoted to art director.

10   Q.   Art director at the newspaper?

11   A.   Correct.

12   Q.   And what does an art director do?

13   A.   As the art director, I managed a design

14 staff. I commissioned artwork from photographers

15 and illustrators, and I managed the budget.

16   Q.   And how long were you the art director at

17 the Santa Barbara Independent?

18   A.   Again, until 2004. Maybe. My memory is

19 not -- I hadn't expected to give a full work

20 accounting.

21   Q.   The reason why I'm asking is in your

22 expert report, I think you identify the basis --

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1   your basis of your opinion. Let me see if I can

2   find that. You say on page 1: In preparing this

3   report, in forming the opinions expressed in it, I

4   relied on my knowledge of drones, photography,

5   mapping, and image processing, as well as the

6   materials cited in this report.

7   And your report cites your degree and

8   obviously your current job. So I'm just trying to

9   get an understanding of your work history, just so I

10   understand your experience, the scope of your

11   experience. So anyway, we're at 2004. And, again,

12   just approximate times, but where did you go next in

13   your work life?

14   A.   I believe at that point I moved jobs to a

15   catalog company.

16   Q.   What's the name of that company?

17   A.   Territory Ahead.

18   Q.   And what was your job there?

19   A.   I was a catalog designer, and I managed

20   photo shoots.

21   Q.   How long did you work for Territory Ahead?

22   A.   I believe I was there for a couple years.

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 1   Q.   So would that be about the 2006 time

 2   frame?

 3   A.   Correct.

 4   Q.   Okay. And where did you go next?

 5   A.   I went back to the Santa Barbara

 6   Independent.

 7   Q.   And what was your job when you went back

 8   to the Santa Barbara Independent?

 9   A.   Design director.

10   Q.   And how long were you the design director

11   after you went back in 2006?

12   A.   I did that for another 3 years, I

13   believe.

14   Q.   So now we're up to 2009. What did you do

15   in 2009?

16   A.   2009, I believe at that point I was

17   freelancing as graphic designer.

18   Q.   What does that mean, freelancing? Were

19   you like an independent contractor working for

20   different people?

21   A.   Correct.

22   Q.   And how long were you freelancing as a

Page 17

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 1   graphic designer?

 2        A.    I did that for I believe 3 or 4 years.

 3        Q.    So would that take us to about 2012 or

 4   '13?

 5        A.    Probably somewhere close to that.

 6        Q.    And up until this point in 2012 or 2013,

 7   it doesn't sound like you've done any work in

 8   mapping or 3D modeling; is that fair?

 9        A.    That is fair.

10        Q.    What did you do in 2012/2013?

11        A.    I took a job at a for-profit university

12   as a graphic artist.

13        Q.    And which school is that?

14        A.    Fielding Graduate.

15        Q.    Where is that?

16        A.    Santa Barbara, California.

17        Q.    And how long did you work at Fielding

18   Graduate University?

19        A.    Until 2015.

20        Q.    And, again, your job was -- what was the

21   job at Fielding, a graphic artist?

22        A.    A graphic artist, yeah.
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 1        Q.    Okay.  And then what did you do in 2015?

 2        A.    I started a drone business.

 3        Q.    What was the name of the business?

 4        A.    Hawkeye Workshop.

 5        Q.    And is that an active business?

 6        A.    Yes.

 7        Q.    And what did you do beginning in 2015?

 8        A.     I started my business as a drone

 9   operator, and I started doing promotional videos

10   and real estate.

11        Q.    And how long did you operate at your

12   company doing promotional videos and real estate?

13        A.    Well, I still do some of that work.

14        Q.    And at any point in time, did you add any

15   services to those two, promotional videos or real

16   estate?

17        A.    Yes.

18        Q.    And when did you do that?

19        A.    2016.

20        Q.    What did you add?

21        A.     I added mapping and 3D modeling and

22   instruction with DARTDrones.
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 1        Q.    And how were you -- how were you able to

 2   add mapping and 3D modeling to your business

 3   activities at Hawkeye, what's the name of the

 4   company, Hawkeye what?

 5        A.    Hawkeye Workshop.

 6        Q.    Hawkeye Workshop.  Did you go to school?

 7   Did you take any classes?  How were you able to --

 8   how did you have the experience to offer mapping

 9   services to clients?

10        A.    Well, I started doing it and figuring out

11   how to make it work, and I don't exactly remember

12   the whole process.

13        Q.    Well, did you take any -- did you go back

14   to school and take any classes in mapping?

15        A.    No.

16        Q.    And did you get any -- did you take any

17   classes, whether it be through university or through

18   private companies on mapping?

19        A.    Only the PIX4D that I talked about

20   earlier.

21        Q.    PIX4D is a software company?

22        A.    Correct.
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1   Q.   And so they offered -- what kind of class

2   or information did they offer you?

3   A.   It was a -- I believe a 3-day class in

4   collection methods and proper use of their

5   software.

6   Q.   And so other than the 3-day class offered

7   by PIX4D, when did you take that class?

8   A.   Boy, I don't remember exactly. I would

9   have to look it up. I think it was 2017.

10   Q.   And so was that the first instruction you

11   received on mapping?

12   A.   First formal instruction, yes.

13   Q.   All right. So in 2016, you start offering

14   mapping services to clients. You haven't taken any

15   classes or anything up to that point. And then in

16   2017, you take a 3-day class with PIX4D; is that

17   right?

18   A.   Correct.

19   Q.   Okay. And prior to offering mapping

20   services for your company, you had never worked for

21   another company offering these services, correct?

22   A.   Correct.

1   Q.   And you never worked under the instruction

2   of anybody with mapping experience, correct?

3   A.   Not formally, no.

4   Q.   Never worked under the charge of anybody

5   with this kind of formal experience or training,

6   correct?

7   A.   Correct.

8   Q.   And are you a -- have you ever taken any

9   classes in survey?

10   A.   No, I have not.

11   Q.   Are you a licensed surveyor in any state

12   in the country?

13   A.   I am not.

14   Q.   Do you offer any services in the field of

15   land surveying?

16   A.   I do not.

17   Q.   Have you ever been -- have you ever

18   contacted any licensing board in any state regarding

19   land surveying and whether your activities fall

20   under the umbrella of the regulation of land survey?

21   A.   No, I have not.

22   Q.   Have you ever been contacted by any

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1   licensing board?

2   A.   No.

3   Q.   So in 2017, you take this class from

4   PIX4D. And then do you continue -- do you add any

5   other services besides mapping and 3D after 2016?

6   A.   Yes.

7   Q.   And what services?

8   A.   Utility inspection.

9   Q.   Anything else?

10   A.   No.

11   Q.   And tell me how you got involved with this

12   company called DARTDrones that you're -- that you're

13   testifying on behalf of today.

14   A.   Yeah, I found an advertisement where they

15   were looking for instructors, and I applied and

16   was accepted.

17   Q.   What kind of an instructor were they

18   looking for?

19   A.   They were looking for manned pilots who

20   had drone experience in order to teach

21   open-enrollment classes in the rules and

22   regulations for Part 107 and basic flight.

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 1   Q.   When did you begin work for DARTDrones?

 2   A.   I believe it was -- let's see. I believe

 3   it was 2017, but I would have to look. It's been

 4   4 or 5 years.

 5   Q.   And so you were able -- you run your

 6   business -- Hawkeye Workshop offers services and

 7   then on the side, you do work for DARTDrones as an

 8   instructor?

 9   A.   Correct.

10   Q.   And then I think if you look at your -- do

11   you have your expert report there?

12   A.   I do.

13   Q.   Okay. It looks like if you look at the

14   second paragraph, second sentence, it says: Since

15   2016, I have also taught mapping, utility

16   inspection, and FAA certification courses for

17   DARTDrones, a national Unmanned Aerial System (UAS)

18   training and development company.

19   Do you see that?

20   A.   I do. I might have had the date off.

21   Q.   Is the correct date 2016, or is the actual

22   correct date 2017 when you started working there?

 1   A.   I initially contacted them in October or

 2   had my evaluation in October 2016, and that's when

 3   I started with them and really began teaching I

 4   think in 2017.

 5   Q.   When I asked you about what they were

 6   advertising for, you said essentially operating a

 7   drone as a pilot?

 8   A.   Uh-huh.

 9   Q.   Were they also advertising for instructors

10   to teach mapping?

11   A.   At the time when I applied?

12   Q.   Yes.

13   A.   No.

14   Q.   And your expert report said since 2016, I

15   have also taught mapping. Did you start teaching

16   mapping courses right away?

17   A.   I did not.

18   Q.   If I understand the timeline, you first

19   began offering mapping services for Hawkeye Workshop

20   in 2016, correct?

21   A.   Correct.

22   Q.   Then in 2017 you took a PIX4D software

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 1   class on mapping, 3-day class, correct?

 2   A.   Correct.

 3   Q.   Did you offer -- were you a mapping

 4   instructor for DARTDrones prior to taking that PIX4D

 5   class?

 6   A.   I don't remember the exact timeline.

 7   Q.   When did you first act as an instructor

 8   for a class in mapping for DARTDrones?

 9   A.   I don't remember the exact date.

10   Q.   Would it be before 2020?

11   A.   Yes.

12   Q.   Okay. So it would be sometime around the

13   2017/2018 time frame?

14   A.   Possibly. Like I said, I really don't

15   remember when that first class was.

16   Q.   Okay. You currently teach an aerial

17   mapping and modeling class with DroneDeploy for

18   DARTDrones?

19   A.   Correct.

20   Q.   And before I move to that, I do want to

21   ask you some questions about that. In your expert

22   report, you say you prepared this report through

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 1    DARTDrones, which has been paid $7500 for the

 2    preparation of this report.  Is that true?

 3         A.    Yes.

 4         Q.    And how were you paid?

 5         A.    I was paid through DARTDrones.

 6                       (Deposition Exhibit Number 2

 7                        marked for identification.)

 8         Q.    All right.  Exhibit 2 -- we talked about

 9    Exhibit 1.  So Exhibit 2 is a copy of a webpage that

10    I captured, I think, last name.  Aerial mapping and

11    modeling with DroneDeploy workshop.

12              Do you see that on the screen?

13         A.    I do.

14         Q.    Okay.  And the exhibit that I sent in the

15    PDF is hard to read.  I think it's easier on the

16    screen.  This appears to be a 2-day class that's

17    offered by DARTDrones; is that right?

18         A.    That's correct.

19         Q.    Okay.  And then I'm scrolling down.  Do

20    you see where it says workshop overview?

21         A.    I do.

22         Q.    And I'll come back to that, but it looks
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 1   like you have ten lessons in your workshop; is that

 2   right?

 3   A.   I believe that's correct.

 4   Q.   And then for some reason the pictures

 5   didn't come out, but you're one of the two

 6   instructors. Is that true?

 7   A.   That's correct.

 8   Q.   Okay. And did you -- that exhibit that I

 9   just showed you, do you recognize that webpage from

10   the DARTDrones website?

11   A.   I haven't been on the DARTDrones website

12   in a while. It's not something I regularly check.

13   Q.   All right. Let me share the screen with

14   you one more time here. Do you see Exhibit 2?

15   A.   Yes.

16   Q.   Okay. And have you seen that brochure

17   before or that advertisement before?

18   A.   A few years ago. Like I said, it's not

19   something that I spend a lot of time on on the

20   DARTDrones website.

21   Q.   Okay. It says Upcoming. Is there an

22   upcoming class, December 13-14 in Houston, Texas?

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1   A.   Possibly. I'm not teaching that class.

2   Q.   Okay. When is the last time you taught

3   one of these classes, aerial mapping and modeling

4   with DroneDeploy workshop?

5   A.   The last time was in September.

6   Q.   Of 2021?

7   A.   Of 2021.

8   Q.   And where did you teach the class?

9   A.   In Dubai.

10   Q.   And when was the time before that that you

11 taught it?

12   A.   I don't know the exact date. It was

13 online in spring, I believe.

14   Q.   This is -- about how often are you

15 teaching these classes? Like, once every 6 months

16 or more often than that?

17   A.   Well, COVID has thrown a wrench in a lot

18 of these things. So prior to COVID, I would have

19 to look at my records, but I believe I was doing

20 three to four classes a year.

21   Q.   Okay. Since 2017/2018?

22   A.   Yes.

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1   (Deposition Exhibit Number 3

2   marked for identification.)

3   Q.   All right.   And then I'm going to screen

4   share here and show you Exhibit 3, which is also off

5   the Internet, a PDF document, DARTDrones.   And it

6   looks more like a formal brochure for this class.

7   Do you see Exhibit 3 on your screen?

8   A.   I do.

9   Q.   And it says: Elevate your career in

10   aerial mapping and modeling.   Develop the skills you

11   need to effectively gather, analyze, and export

12   mapping data.

13   Have you seen this brochure before?

14   A.   I haven't seen the brochure.

15   Q.   It looks like ten lessons that are

16   identified on this brochure is consistent with the

17   same ten lessons that are advertised on your

18   website.   Does that sound right?

19   A.   That sounds right.

20   Q.   And then the class you taught in Dubai,

21   did you teach ten lessons as well over 2 days?

22   A.   This was a little bit different class

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 1   setup, so we covered most of this information.

 2   Q.   And did you -- when you have these

 3   classes, do you have like a textbook or a binder of

 4   materials that you're handing out that cover all

 5   these ten lessons?

 6   A.   Yes, we do have a handout.

 7   Q.   And how long is the handout? How many

 8   pages?

 9   A.   I don't remember. I -- you know ...

10   Q.   Is it more than a hundred or less than a

11   hundred?

12   A.   Gosh, I don't remember. It's

13   substantial.

14   Q.   Okay. Now I'm going to show you what's

15   marked as Exhibit -- do you have a copy of your

16   binder of materials that you offer?

17   A.   I don't have one here.

18   Q.   But, I mean, you have access to it or you

19   have it on your computer or something like that?

20   A.   I have some of the handouts in a storage

21   locker.

22   Q.   Okay.

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1   A.   At the moment.

2   (Deposition Exhibit Number 4

3   marked for identification.)

4   Q.   I'm going to show you what's been marked

5   as Exhibit No. 4, which is just a better copy of the

6   aerial mapping and modeling with DroneDeploy

7   workshop or workshop overview. Do you see that on

8   the screen?

9   A.   I do.

10   Q.   Okay. And then lesson No. 2, aerial

11   photogrammetry?

12   A.   Yes.

13   Q.   And what is aerial photogrammetry?

14   A.   Well, are you asking what we cover in

15   Lesson 2.

16   Q.   No. Lesson 2, the title is Aerial

17   Photogrammetry. Do you see that?

18   A.   I do.

19   Q.   And I'm just asking you, what is aerial

20   photogrammetry? What does that mean?

21   A.   Well, photogrammetry is the process

22   that's used with the images that you collect with

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 1   the drone in order to create these products that I

 2   mentioned earlier.

 3   Q.   And you say "the process." How does --

 4   can you explain to the judge how this works? How

 5   does aerial photogrammetry work?

 6   A.   Well, in a nutshell, images that have

 7   been geotagged and collected in a specific manner

 8   are processed through some software that basically

 9   puts these images together in a fashion that makes

10   them usable in certain ways. There's some

11   processes that the software does in order to tie

12   these images together.

13   Q.   And you said images that have been

14   geotagged. What does that mean, geotagged?

15   A.   When a drone, a commercial drone takes an

16   image in the metadata, latitude, longitude, and

17   altitude are recorded, and that's geotagged.

18   Q.   And then you say, you explain to the Court

19   that these images that have been geotagged are

20   processed through software. How does that work?

21   How does photogrammetry work?

22   A.   The software looks for identical points

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 1   present in multiple photographs. And given that

 2   the software can read the geotags and it knows the

 3   position of the camera, it can triangulate these

 4   points and orient them left, right, and altitude

 5   based on their geotag.

 6   Q.   And then under aerial photogrammetry, you

 7   have under less than two -- well, first, have you

 8   taken any classes in photogrammetry?

 9   A.   I have not.

10   Q.   Okay. And have you -- do you have any

11   experience working in the field of photogrammetry?

12   A.   Other than either using the software that

13   really does all the work, you know, I understand

14   how to use the software.

15   Q.   DroneDeploy?

16   A.   Yeah, I can use DroneDeploy. I prefer

17   PIX4D.

18   Q.   But this workshop you're instructing in is

19   actually a workshop for DroneDeploy, correct?

20   A.   Correct.

21   Q.   And you're saying the DroneDeploy or PIX4D

22   does all the work?

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 1   A.   It does the triangulation and the

 2   stitching of images, yes.

 3   Q.   And then under principles of

 4   photogrammetry, what are you teaching there?

 5   A.   Just the basic ideas of how the software

 6   uses the images and just kind of a basic overview

 7   of what photogrammetry is.

 8   Q.   And what is that? What do you tell the

 9   student? How does the software use the images, and

10   what is photogrammetry?

11   A.   Well, photogrammetry is using images in

12   order to make measurements.

13   Q.   Aerial photogrammetry, would you agree, is

14   the science of deducing the physical dimensions of

15   objects on or above the surface of the earth from

16   measurements on actual photographs of the objects?

17   A.   I haven't heard that definition, but that

18   sounds consistent with photogrammetry.

19   Q.   What is photogrammetric geometry?

20   A.   I'm not exactly sure what they mean on

21   that. I haven't seen this handout. I believe

22   what they're referencing is just how the

Page 35

1   triangulation process works.

2   Q.   Triangulation is an important part of

3   photogrammetry?

4   A.   Yes.

5   Q.   And earlier you talked about geotag. When

6   you're instructing in the area of photogrammetry,

7   you're -- the process I guess is you're taking

8   pictures from the air; is that right?

9   A.   That's correct.

10   Q.   Okay. And those pictures are determining

11   the size and shape of the earth below?

12   A.   The photographs themselves are not.

13   Q.   Okay. What allows you, the person who's

14   acting as a photogrammetrist, what allows you to

15   determine the size and shape of the earth both

16   horizontally and vertically?

17   A.   I don't think I understand your question.

18   Q.   Okay. When you offer -- do you offer

19   services in Hawkeye Workshop in photogrammetry?

20   A.   Not directly.

21   Q.   Okay. Have you ever offered services to a

22   client in the area of photogrammetry?

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 1   A.   I don't -- I don't understand the

 2   question because that's not a service that I'm

 3   offering.

 4   Q.   All right. I guess I'm just trying to

 5   understand it from your perspective. You're

 6   designated as an expert witness in this current

 7   case, correct?

 8   A.   Yes.

 9   Q.   Okay. And you're designated to talk about

10   how you use drones in order to provide mapping

11   products, correct?

12   A.   Correct.

13   Q.   And you actually have experience in

14   acting -- providing these kind of services for your

15   company, Hawkeye Workshop, correct?

16   A.   Yes.

17   Q.   And you have -- and you have experience in

18   acting as an instructor in the -- in the area of

19   aerial mapping using drone deployment, correct?

20   A.   Yes.

21   Q.   All right. And so looking at your

22   workshop overview, and Lesson 2 is Aerial

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1 Photogrammetry, I'm trying to understand when you're

2 teaching, you're teaching Lesson 2, correct, as an

3 instructor?

4   A.   Correct.

5   Q.   Okay. And I'm asking, have you provided

6 photogrammetry services to any client?

7   A.   I guess I don't -- it's not offered that

8 way to my clients.

9   Q.   And I'm not asking how you advertise it

10 because I guess what I'm hearing you say is "I don't

11 advertise that I offer photogrammetry services,"

12 correct?

13   A.   Correct.

14   Q.   Some of the services that clients hire you

15 to do, do involve the area of -- the idea of aerial

16 photogrammetry, correct?

17   A.   It's part of the process.

18   Q.   Okay. And it's part of the process that

19 you and the work product that you provide to some of

20 your clients, correct?

21   A.   Correct.

22   Q.   Okay. And so when we talk about the

Page 38

1 services that you've provided in the area of

2 photogrammetry, how do you determine the size and

3 shape of the earth, both horizontally and

4 vertically, when you provide these services?

5   A.   I -- there are -- it feels like there are

6 a few ways to answer this question. The question

7 sounds very broad to me. That's why I'm not

8 understanding what you're asking me exactly.

9   Q.   Well, would you agree that photogrammetry,

10 among other things, includes the determination of

11 the size and shape of the earth, both horizontally

12 and vertically?

13   A.   That's one part of it.

14   Q.   Okay. And another part is the positioning

15 of certain points on the earth that you use as

16 either key points or tie points to be able to do

17 this triangulation, correct?

18   A.   Yes.

19   Q.   Okay. And then you, using this data,

20 right, these photos, trying to determine the size

21 and shape of certain objects on the earth using tie

22 points or key points to ultimately conduct certain

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 1   measurements and offer a product to the clients,

 2   correct?

 3   A.   Measurements are not always part of the

 4   product offered.

 5   Q.   I'm just going by your testimony earlier,

 6   I thought, was photogrammetry is using images to

 7   make measurements?

 8   A.   That's the definition of photogrammetry.

 9   Q.   Okay. And the images that you're using

10   that you're taking via a drone, the drone is the

11   tool you use to get the images, right?

12   A.   Correct.

13   Q.   And you use the drone and there might be

14   certain technology that you attach to the drone?

15   A.   Okay.

16   Q.   Is that true?

17   A.   Yes.

18   Q.   And so you have a drone, you have a

19   camera, and then you use some software, and you're

20   collecting images that determines the size and shape

21   of the earth, right?

22   A.   I'm generally not concerned with the

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 1   products that I produce on the size and shape of

 2   the earth, per se.

 3   Q.   Okay. So how do you use the images to

 4   make measurements? I guess if photogrammetry is

 5   using images to make measurements, how do you do

 6   that as a photogrammetrist?

 7   A.   Well, there's a number of ways to do

 8   that. I use the software that I know how to use

 9   in order to make those measurements.

10   Q.   And so take the judge through this. So if

11   I hire you, my law firm hires you and I want you to

12   perform aerial mapping, I'm going to build a new law

13   office and I need to be able to design it, put it

14   down on the piece of property, and I want you to

15   provide services and aerial map photogrammetry

16   services, how do you do it? How do you actually go

17   to the property that I want to buy, and how do you

18   perform those services for me?

19   A.   Are you asking me to do a complete

20   run-through of my workflow?

21   Q.   Correct. I'm saying, I -- my law firm and

22   an engineering company I work with, a construction

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 1   company, let's say, I'm hiring you to perform

 2   certain services. And how do you do that? How do

 3   you provide me those services or the work product?

 4   In other words, how do you use images to make

 5   measurements is ultimately what I want to know.

 6   A.   It's completely dependent on what the

 7   deliverable that you require is, so the workflow

 8   partly is based on what I'm delivering to you.

 9   Q.   Okay. Let me make it -- instead of using

10   a hypothetical that's not in your report, why don't

11   we use an example that's in your report. And then

12   you can kind of educate me how you perform

13   photogrammetry services.

14   So one example that you use is on page 5

15   of your report, at the top, and I'm going to read

16   the last couple sentences of that paragraph at the

17   top of page 5. And you say in your report as

18   follows: For example, consider a construction

19   company that wants to place a fence around a job

20   site. The company could hire a drone pilot to take

21   aerial photos of the site and then use software to

22   measure the perimeter of the site. If the company

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 1   wants to know how much fencing to purchase, relative

 2   accuracy is more important than absolute accuracy.

 3   It matters how long the perimeter is, not where it

 4   is on the earth. By contrast, if the company wants

 5   to know precisely where to place the fence so that

 6   it does not trespass on a neighbor's property,

 7   absolute accuracy may be essential. In that

 8   scenario, it matters where the boundary is on the

 9   planet, not how long it is. Do you see that on your

10   report?

11   A.   Yeah, yeah.

12   Q.   Okay. So let's use the example of a

13   company that wants to hire you to perform, I guess,

14   a deliverable so that they know how much fencing to

15   order and where to place fencing on the boundary.

16   How would you go about performing those services?

17   A.   Well, I would go out to the property and

18   fly the property, collect the needed images, put

19   those images, process those images through the

20   software, and use the software in order to measure

21   a perimeter of their area and obtain GPS points

22   from the software if they wanted to know where to

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1   put the fence.

2   Q.   What software would you use?

3   A.   Personally I would use PIX4D.

4   Q.   And so you would use -- you have a drone,

5   correct? That's a tool that you use, right?

6   A.   Right.

7   Q.   And what other tool? Do you have

8   something attached to the drone to take the

9   pictures?

10   A.   Yeah, it's -- I use a Phantom 4, and it

11   has an attached camera on it.

12   Q.   So you have a camera; that's another tool

13   you use, correct?

14   A.   Correct.

15   Q.   And then you use the PIX4D software or you

16   could use DroneDeploy software? That's another tool

17   you use?

18   A.   Correct.

19   Q.   And you indicate when you get back, after

20   you go and fly the site, take the pictures, then you

21   go back and then you process the pictures using the

22   software?

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```
 1     A.    Correct.

 2     Q.    Okay.  And then how do you -- how do you

 3  conduct measurements so that they know how much

 4  fencing they're going to need to order?

 5     A.    Well, the software helps you with that.

 6     Q.    And how do you do it, though?  Explain to

 7  the judge how that's done.  So up to this point, it

 8  sounds like even though I'm a lawyer, I could go buy

 9  a drone, I could go to the site, I could go buy a

10  camera, I could down some software, I could fly the

11  drone, go back to my law office, download the

12  pictures, log in to DroneDeploy, push a button, and

13  all the work would be done for me; is that right?

14     A.    Yes, to a degree.

15     Q.    Okay.  And so now I've generated -- when I

16  pushed the button and I took all my photos, what

17  kind of work product have I just generated on my

18  computer?

19     A.    Well, you know, it depends on how you

20  have the software set up, what you generate.  The

21  first thing that's created is a point cloud.

22     Q.    And what is a point cloud?
```

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 1   A.   A point cloud is all of these key points

 2   and high points that the software has found that

 3   are represented as a file that is

 4   three-dimensional and orients these points in

 5   space.

 6   Q.   When you say -- when you go on to the site

 7   or if I went on to the site, do you find any of

 8   these key points or high points yourself?

 9   A.   No.

10   Q.   So that's -- do you do anything for the

11   software to actually find these points, or is it

12   just sort of automatic after you push the button?

13   A.   Well, with PIX4D, it goes through and

14   finds key points and high points for you. You do

15   also have the option of selecting manual tie

16   points.

17   Q.   But in this case, this company that hires

18   you to take the photos using your drone and then

19   generate a work product of doing a measurement of

20   the -- of the property so that they can order

21   fencing, you would just download the pictures into

22   the PIX4D and you would push a button and it would

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 1 generate this work product for you, correct?

 2   A.   Yeah.   I would use the software to

 3 generate the point cloud.   There are, you know,

 4 settings that are more appropriate than others, so

 5 there is some knowing how to work the software

 6 properly.

 7   Q.   It might --

 8   [Simultaneous crosstalk]

 9   A.   -- bit of software -- having the right

10 coordinates, telling the software the proper

11 camera that's being used.   There are a bunch of

12 parameters that can be set prior to processing.

13   Q.   And do you normally manually change those

14 parameters, or do you go with the default?

15   A.   It depends entirely on the job.

16   Q.   Okay. What would you do in this job if

17 you went to the fencing site company and flew your

18 drone and went back and ultimately they wanted you

19 to produce a work product that fit your hypothetical

20 or your example on page 5, would you modify the

21 settings or would you use the default settings?

22   A.   Personally I always modify a little bit,

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 1   but that's up to the user, really.

 2   Q.   And how do you modify it?

 3   A.   It depends on the project. I just

 4   like -- personally like to monitor. There are

 5   several steps in order for the software to do its

 6   processing, and so I do those generally one at a

 7   time and check that things are accurate. If the

 8   first pass isn't, you know, as accurate as I would

 9   like it to be, I can come back and tweak it a

10   little bit before I do the additional steps.

11   Q.   And so take me through that. How do you

12   determine, these steps that you're talking about,

13   what steps are they that you're modifying or you're

14   manually, I guess, controlling and how do you

15   determine the accuracy?

16   A.   PIX4D generates an accuracy report in its

17   process and so it looks at how images are

18   calibrated and how they are meshing and the number

19   of key points found. It's pretty processor

20   intensive to do this kind of work, so there are

21   resolution changes that you can make to have it

22   find more or less key points. It will run a

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 1   little bit faster looking for less key points than

 2   more key points but won't be as accurate, things

 3   like that.

 4   Q.   And so as far as accuracy goes, you're

 5   relying on the software?

 6   A.   I look at the accuracy report, yes.

 7   Q.   Generated by the software?

 8   A.   Generated by the software.

 9   Q.   Okay. And do you do anything else to

10   confirm the accuracy of this photogrammetry project?

11   A.   For something -- for a project like this

12   where the accuracy is close enough for determining

13   fencing, it's a good enough check.

14   Q.   I'm sorry. So is the answer no, you don't

15   do anything else other than use the software?

16   A.   For our example, yes.

17   Q.   All right. You say because it's good

18   enough to give a rough estimate of how much fencing

19   they need to order?

20   A.   Correct.

21   Q.   Okay. And what does "good enough" mean?

22   What kind of level of accuracy do you need to

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 1   provide the client that hires you for this project?

 2   A.   Well, again, that goes back to, you know,

 3   knowing what the client wants, and that's a

 4   discussion that you have before you process your

 5   images, before you do the work. But the accuracy

 6   of PIX4D is generally within inches. And for

 7   something like a fence, you're dealing in, you

 8   know, feet of fence. So the accuracy is more than

 9   enough.

10   Q.   Okay. So as long as it's within a couple

11   of feet, it's accurate enough?

12   A.   No.

13   Q.   Okay.

14   A.   That would not be -- that would not be

15   accurate enough. But my point -- my point is that

16   the accuracy is more than enough for determining

17   the amount of fence, fencing material because --

18   Q.   The accuracy from the, in essence, pushing

19   the button and letting the software do its thing,

20   correct?

21   A.   Sure.

22   Q.   Okay. And in this hypothetical or this

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 1   example that you have in your expert report, the

 2   company wants to know how much fencing to purchase.

 3   And in that situation, what I hear you saying is

 4   that you can rely on the tools that you use in the

 5   area of photogrammetry to take the pictures and run

 6   the software; is that right?

 7   A.   Yeah.

 8   Q.   Okay. And then the company also wants to

 9   know precisely where to place the fence on its

10   property so it does not trespass on a neighbor's

11   property, right?

12   A.   Potentially. I would like to say that

13   this example was more about the different types of

14   accuracy that are available and relative versus

15   absolute, and it's just an example. The

16   information provided to give them the distance of

17   fence is different. It's a different -- requires

18   some different -- different process to get

19   absolute accuracy.

20   Q.   And I want to -- I'm sorry. I didn't mean

21   to cut you off. I'm sorry.

22   A.   No, go ahead. I was done.

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```
 1          Q.    So I want to use your example.  So now a

 2     company hires you, Hawkeye Workshop, to produce a

 3     work product so that they know on their piece of

 4     property where to place the fence so that they do

 5     not trespass on a neighbor's property.  What do you

 6     do?  How do you generate that work product?

 7          A.    In order to do that, I would have to

 8     place some ground control points in order to get a

 9     better absolute accuracy.

10          Q.    All right.  And what training have you

11     done in placing or do you have in placing ground

12     control points?

13          A.    Just work experience.

14          Q.    Okay.  So the answer is none?  Do you have

15     any training or education in placing ground control

16     points?

17          A.    No.

18          Q.    All right.  And you're not a licensed

19     surveyor, correct?

20          A.    No.

21          Q.    Okay.  And so how do you do this?  How did

22     you teach yourself how to place ground control
```

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 1   points?

 2   A.   There are ground control points offered

 3   by a company in Australia that I've used in the

 4   past.

 5   Q.   So tell the judge or the jury, how do you

 6   do this? How do you go out and place the ground

 7   control points so you can provide a work product to

 8   let the company know where exactly to place its

 9   fence on the property?

10   A.   The ground control points have GPS

11   receivers in them, and they're placed throughout

12   the area and left there in order to get their

13   position and that position is then sent to the

14   company that creates the ground control points,

15   and they give back information on the ground

16   control points that I then input into PIX4D.

17   Q.   So you're using -- are you flying your

18   drone?

19   A.   Yes.

20   Q.   Okay. And you're taking pictures of the

21   site?

22   A.   Yes.

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```
 1       Q.   And you're using ground control points or

 2   data from ground control points that you personally

 3   installed on the site?

 4       A.   If that's what the job requires.

 5       Q.   Well, and I'm just -- you're saying it

 6   would, that's how you would do, correct?

 7       A.   Correct.

 8       Q.   And then you're using a company out of

 9   Australia to create this data on the ground control

10   points?

11       A.   Yeah, they offer that service.

12       Q.   What's the name of the company?

13       A.   AeroPoints, I believe.  I don't know if

14   that's the product or the company.  Oh, I believe

15   the company is called Propeller.

16       Q.   Propeller?

17       A.   Yeah.  I don't remember off the top of my

18   head.

19       Q.   And then you're -- what do you get from

20   them?  Do you get like a file or data or set of data

21   in your file?

22       A.   Yes.
```

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 1   Q.   And then you take that file and you, what

 2   do you do? Download it into either DroneDeploy or

 3   this PIX4D?

 4   A.   Correct.

 5   Q.   And then what do you do at that point?

 6   You also push a button to create some sort of data

 7   file?

 8   A.   No. You have to manually go through some

 9   images and identify these ground control points in

10   images. So you're telling the software this is

11   ground control point No. 1, and you do that over a

12   series of images. So the software knows where

13   that ground control point is.

14   Q.   Okay. And then what happens next?

15   A.   That is worked into the algorithm of the

16   software and the software -- helps the software do

17   its work.

18   Q.   All right. Then what happens? What work

19   does the software do?

20   A.   Well, it's the ground control points tell

21   the software what these very specific points are,

22   so it helps the software then tie this into a

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1   coordinate system.

2   Q.   And then what are you producing for the

3   client so that they know where to put their fence?

4   A.   Depends upon the client and what they

5   want.

6   Q.   Okay. This client wants to know where

7   precisely to place the fence so it does not trespass

8   on a neighbor's property.

9   A.   Yeah. I could give them GPS points. I

10 could show them on an image where that should go.

11   Q.   And you would use -- and how would you do

12 that? Do you then pull an image down? Is this

13 something you're doing yourself, or is this

14 something software is going to help you do?

15   A.   Yeah, it's something software would help

16 you do.

17   Q.   Okay. And are you actually drawing a line

18 on the image all the way around, or are you just

19 putting in certain points and then connecting the

20 points?

21   A.   It would depend. I'm not quite really

22 sure how to answer that question.

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```
 1        Q.    Okay.  I guess the question is:  So this

 2   client came to you and asked you to do these

 3   photogrammetry services.  And you went out, you flew

 4   the site.  You said you put in your own ground

 5   control points.  You took some data from Propeller.

 6   You installed it into PIX4D.  And so now how do you

 7   give the client a work product that will help them

 8   know where to put their fence?

 9        A.    Well, it depends on -- again, it depends

10   on the client.  Some clients are technologically

11   savvy.  Some are not.  It entirely depends on who

12   you're working with.

13        Q.    Okay.  Assume the client is not

14   technologically savvy and they just want to know

15   where on their property they put the fence so they

16   don't trespass on a neighbor's property.  What work

17   product are you giving them?  Are you giving them a

18   map?

19        A.    I would give them a map, yes.

20        Q.    Okay.  And that's consistent with your --

21   I guess this course in mapping that you offer,

22   right, you would provide them a map and the map
```

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```
 1   would show them what?

 2        A.   Potential points.

 3        Q.   And potential points, that would show them

 4   where to put their fence on the edge of their

 5   property, correct?

 6        A.   If that's what they were looking for,

 7   yeah.

 8        Q.   Okay.  And what happens if you're -- if

 9   your work product contains an error or is not

10   accurate, what's the result of that?

11        A.   Well, the result I suppose could be a

12   misplaced point.

13        Q.   A misplaced fence, correct, in your

14   example?

15        A.   Potentially.

16        Q.   And that would impact the client that

17   hired you, right?

18        A.   Uh-huh.

19        Q.   Yes?

20        A.   Yes.

21        Q.   Okay.  And it would adversely impact not

22   only the client, but it could adversely impact the
```

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1   neighbor if the fence was placed on the neighbor's

2   property, correct?

3   A.   Correct.

4   Q.   Okay. We've been going for about an hour

5   and 20 minutes. Do you want to take a break, or are

6   you good to continue?

7   A.   I could take a break.

8   MR. HANNA: Okay. Let's take a 5-minute

9   break.

10   THE WITNESS: Thank you.

11   (A short break was taken.)

12   Q.   So I want to go back to Exhibit 4, which

13   is the workshop overview and Lesson 2 that you teach

14   as an instructor at your company, DARTDrones. And

15   we talked a little bit about the first couple of

16   bullet points, and I think we talked about aerial

17   triangulation. And again, just briefly explain to

18   the Court, what is aerial triangulation?

19   A.   It's orienting a point in space from

20   various viewpoints in order to determine its

21   position.

22   Q.   And then photogrammetric procedures, I

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 1   don't know if I'm pronouncing that correctly, what

 2   do you cover there when you're teaching a class?

 3   A.   Basically it's a short explanation of

 4   what the software is doing in order to do its

 5   work.

 6   Q.   And other than the software, do you teach

 7   any other procedures in photogrammetry?

 8   A.   No.

 9   Q.   Other than the software, do you have any

10   experience in other procedures in photogrammetry?

11   A.   No.

12   Q.   And when you talk about the next bullet

13   point, Common Coverage Errors, what are you

14   referring to there?

15   A.   Common coverage errors have to do with

16   explaining some ways that you might not collect

17   the proper number of images for a given situation

18   in order for the software to do its work.

19   Q.   And how would you protect against that?

20   So if I was flying my drone, I took pictures and I

21   was trying to produce a work product for the company

22   that wanted to know how much fencing to put in and

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 1   where to put the fencing in, how would I know I

 2   didn't take enough pictures or the right pictures?

 3   A.   There would probably be a number of

 4   things. You might get that information from the

 5   error report that PIX4D creates. Your products

 6   might not look right. There may be issues with

 7   the outputs from PIX4D, so there's a number of

 8   ways to go.

 9   Q.   So assuming that the software processed

10   the image and there was no error message, what I

11   hear you saying is then it really kind of comes back

12   onto the operator to make sure that they review the

13   work product to make sure its still accurate or

14   doesn't have any obvious errors?

15   A.   Well, yeah. Yes. Yeah.

16   Q.   And so, again, it comes back to having

17   some level of experience or training in this area of

18   photogrammetry, correct?

19   A.   Suddenly to read a report or look at an

20   image, it's clear that there's a problem.

21   Q.   And if that person doesn't have any

22   training or experience and produces a report with

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```
 1    errors, it's going to adversely affect the client,

 2    correct?

 3         A.    Potentially.

 4         Q.    And it could adversely affect the

 5    adjoining property owner, correct?

 6         A.    Potentially.

 7         Q.    Okay.  And what is -- when you say

 8    "potentially," how so?  How would it adversely

 9    affect them?

10         A.    That's entirely dependent on the

11    situation and what the client is asking for and

12    what the error is.  There's no way to give you an

13    answer.

14         Q.    There's many possibilities, correct, how

15    they could be adversely affected?

16         A.    Okay.  Yes.

17         Q.    Is that true?  Okay.  What is

18    georeferencing?

19         A.    Georeferencing has to do with absolute

20    accuracy.  So in order for there to be absolute

21    accuracy, you need to use a coordinate system and

22    reference the product to some kind of coordinate
```

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1 system.

2   Q.   Are we back to the manual tie points or

3 manual key points that you would install yourself?

4   A.   No.

5   Q.   Okay. So when you say "referencing

6 points," that's something that the software can do

7 for you?

8   A.   I don't understand your question.

9   Q.   Maybe I don't understand what

10 georeferencing means. When we talk about

11 georeferencing, is that something that the software

12 is going to be able to do for you?

13   A.   Yes. It's -- given the proper

14 information, the software will do its work, yes.

15   Q.   Okay. And then spatial reference systems,

16 what is that?

17   A.   That just covers different coordinate

18 systems.

19   Q.   Give me an example.

20   A.   Well, probably the most common coordinate

21 system that people are familiar with is just GPS,

22 which is a latitude and longitude and an altitude.

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```
 1   But there are other ways to reference this

 2   information to a coordinate system or the

 3   coordinate systems that you can use.

 4        Q.   And then Lesson 3 is getting started with

 5   DroneDeploy.  As I understand it, you don't even

 6   need to have a paid subscription to use a certain

 7   level of DroneDeploy; is that true?

 8        A.   I believe that's correct.  There are --

 9   they do give you some ability to try out the

10   software, but it's feature limited.

11        Q.   Do you need to go through any classes in

12   order to be able to use the software or all I need

13   to do is go to the website and download it?

14        A.   DroneDeploy isn't anything that you

15   download.  It's a cloud service.

16        Q.   Okay.  So I just go to the website?

17        A.   Correct.

18        Q.   And so if I wanted to provide photo -- or

19   services in photo geometry, photogrammetry, I'm

20   sorry, I'm pronouncing it wrong, to a client, this

21   construction client and they called me and they

22   wanted me to do this, all I need to do is I need to
```

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```
 1    first buy a drone, right?

 2         A.    Yeah.

 3         Q.    And I need to buy a camera that goes on

 4    the drone, correct?

 5         A.    If it's not already equipped with one,

 6    yes.

 7         Q.    Okay.  And then with that, with those

 8    tools, I can then go to the site, fly the site, take

 9    the pictures, and I can log in to DroneDeploy myself

10    using the Internet, correct?

11         A.    Correct.

12         Q.    And then I can download the data from my

13    camera on my drone and then -- and if I just want to

14    go with the default settings, I can ask DroneDeploy

15    to process the data, right?

16         A.    Correct.

17         Q.    And then that would allow me to provide

18    the work product to the client on your -- at least

19    as to the amount of fencing they might need,

20    correct?

21         A.    Correct.

22         Q.    Okay.  And so it sounds like I can do all
```

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 1   that without having any degree, taking any classes,

 2   having any training, or having any work experience.

 3   Would you agree with that?

 4   A.   Yes.

 5   Q.   And then obviously there's some risks

 6   because we talked about errors. And the risks are

 7   that I really don't know what I'm doing and I

 8   provide a faulty work product to this client who's

 9   relying on me to provide accurate information,

10   right?

11   A.   There's the potential for that.

12   Q.   And that potential could not only impact

13   my client but it could impact others, meaning their

14   neighbors, if it's an issue involving boundaries or

15   real estate, correct?

16   A.   Potentially, yes.

17   Q.   Okay. And then Lesson 4 you have on 3D

18   modeling. Well, let me go back. So how do you

19   protect against that? How do you protect against

20   somebody going to buy a drone, buying a camera,

21   offering services, and pushing a button on

22   DroneDeploy when they really don't know what they're

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```
 1   doing?

 2        A.    Are you asking me how I would do that or

 3   a person?

 4        Q.    Well, how does one do that?  How is the

 5   client -- how is the client protected in that

 6   scenario against somebody who really doesn't know

 7   what they are doing but is often the client services

 8   in the field of photogrammetry?

 9        A.    That's up to the client.

10        Q.    Okay.  So buyer beware?

11        A.    Okay.

12        Q.    Is that true?

13        A.    Yes.

14        Q.    Okay.  Now, you teach Lesson 4, 3D

15   modeling?

16        A.    Uh-huh.

17        Q.    And you say:  Collecting oblique imaging

18   for 3D modeling.  What does that mean?

19        A.    Well, in order to create the best

20   possible 3D model, you need to collect imagery in

21   a certain way that's different than if you're

22   essentially going to provide a flat map.
```

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1   Q.   It's more complicated, correct?

2   A.   It requires some additional capture.

3   Q.   Okay. And then I think maybe the best

4   thing to do is kind of go back to your report. And

5   your report talks about, if you have that in front

6   of you, on page 3, do you see where it has mapping

7   modeling?

8   A.   At the bottom?

9   Q.   Yes.

10   A.   Yes, I see that.

11   Q.   And I think we talked about this before,

12 but reading from your report, it's stated a little

13 differently. It says: Aerial mapping and modeling

14 involved the process from making references from

15 georeferenced photographs. Do you see that?

16   A.   I do.

17   Q.   That's photogrammetry, correct?

18   A.   Yeah.

19   Q.   All right. And then the next page says --

20 I'm skipping a sentence. But there's a sentence

21 that reads: By combining multiple overlapping

22 images into one composite image, however, points

Page 68

 1   that appear in multiple images can be triangulated

 2   and measurements become possible.

 3   Do you see that?

 4   A.   I do.

 5   Q.   So the triangulation is one thing that

 6   allows you to take proper measurements?

 7   A.   Yes.

 8   Q.   And then you go on in your expert report

 9   to say: The software finds objects or geographical

10   points that repeat in multiple photos called key

11   points and uses those objects and the georeference

12   locations where the photos were taken to orient the

13   key points in three-dimensional space.

14   Do you see that?

15   A.   I see that.

16   Q.   Okay. And the key points that we were

17   talking about, or tie point, is what allows you to

18   conduct this triangulation and allow the user to

19   take proper measurements?

20   A.   That's correct.

21   Q.   And then you go on to say: The composite

22   image is the result, and it can take various forms

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```
 1   such as georeferenced composite image, called

 2   orthomosaic, or 3D model.  Do you see that?

 3        A.   I see that.

 4        Q.   And these images, these orthomosaic image

 5   or the 3D model, is the work product of

 6   photogrammetry, correct?

 7        A.   It's one of the outputs that's available.

 8        Q.   There's -- I think this is what you were

 9   mentioning a minute ago.  But orthomosaic map is

10   different than a 3D model, correct?

11        A.   Correct.

12        Q.   And it sounds to me like reading your

13   report that it's easier to create an orthomosaic

14   than it is a 3D model?

15        A.   A 3D model requires some additional

16   images in order to obtain a good model.

17        Q.   Skipping to -- so if I skip to page 7, you

18   start talking about the products.  Do you see where

19   it says orthomosaic maps on page 7?

20        A.   Uh-huh.

21        Q.   And you say:  Orthomosaic maps are

22   top-down images of large areas and are georeferenced
```

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 1 and measurable. Do you see that?

 2   A.   I do.

 3   Q.   You say: Ortho maps are useful for a

 4 number of different applications. Can you explain

 5 to the Court what the different applications are for

 6 the use of these orthomosaic maps?

 7   A.   Well, they have a lot of applications

 8 from just being able to accurately represent a

 9 large area, which is probably their most basic

10 function, to being able to georeference points on

11 an image.

12   Q.   Georeference points would allow you to do

13 what? Take measurements?

14   A.   That would be one use, yes.

15   Q.   And draw property boundaries?

16   A.   That -- that would be up to what the

17 client wants.

18   Q.   Well, I'm asking you, though, if the

19 client wanted that, you could provide that using

20 this orthomosaic map?

21   A.   Potentially.

22   Q.   What else could you do with this data?

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```
 1        A.    You can do volumetrics with this

 2   information.

 3        Q.    And what is volumetrics?

 4        A.    Volumetrics is determining the volume of

 5   perhaps a pile of gravel or determining how much

 6   material you might remove in order to do a certain

 7   function.

 8        Q.    It sounds like when certain clients would

 9   need that information to be accurate in order for

10   them to be able to make use of the information,

11   correct?

12        A.    It would depend on what they're using

13   that information for.

14        Q.    And what do -- in your experience, what do

15   clients use volumetrics or this volumetric data for?

16        A.    My experience has been they want to make

17   sure that they don't perhaps not have enough

18   trucks to move a certain amount of material or

19   spend too much money for too many trucks,

20   something like that.  They're wanting a good

21   measure of what the material is so they know how

22   to manage its removal or sale.
```

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```
 1        Q.   All right.  And then on the orthomosaic

 2   map, again, that's something that it sounds like --

 3   it sounds like the operator can take pictures using

 4   his drone or her drone, take the data, the pictures,

 5   data, download it into DroneDeploy, push a button,

 6   and it creates an orthomosaic map?

 7        A.   That's part of the DroneDeploy process,

 8   yes.  It creates an orthographic map.

 9        Q.   And the 3D modeling has a little more

10   detail, right?  It's not just like I'm taking

11   photos, any old photos, and then downloading that

12   data into DroneDeploy and pushing a button?  There

13   are some additional steps, right?

14        A.   What it amounts to is there needs to be

15   some additional coverage in terms of images.

16        Q.   And how do you go about?  How do you make

17   sure you provide the additional coverage and take

18   the photos that are necessary to allow the software

19   to create a 3D model?

20        A.   Well, part of that is -- partly is

21   experience and knowing what the software needs,

22   and some of it is a very basic process, just in
```

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```
 1   terms of there are things that a top-only/top-down

 2   image misses so you're supplementing some

 3   potential holes in information by some additional

 4   images.

 5        Q.   And so if I -- if I need to, as a client

 6   need to hire you to produce 3D model, how do I know

 7   you have enough experience and knowledge to

 8   provide -- take the necessary pictures to create an

 9   accurate 3D model?

10        A.   There isn't any way, I guess, right now

11   to determine that other than past work.

12        Q.   And in this case, that might create a

13   problem, right, if the client hires somebody that

14   doesn't know what they're doing on 3D modeling?

15        A.   Again, it depends entirely what they're

16   using it for.

17        Q.   You say in your expert report on page 8:

18   Unlike an ortho map, which requires only nadir or

19   top-down photographs that can be taken autonomously

20   by the drone, the 3D model requires taking oblique

21   images or images from multiple angles and altitudes.

22             Can you unpack that and explain it to me?
```

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1   A.   In a top-down nadir image, often the

2   sides of things are missed a little bit. And to

3   create a good 3D model of something that has

4   detail on its sides, like a building, something

5   like that, you need to take images essentially of

6   more detailed images of the side surfaces of

7   structures in order to get good resolution.

8   Q.   And how do you know how to do that?

9   Again, is that just experience?

10   A.   Are you asking me personally?

11   Q.   Yes. Well, you're the designated expert

12   on the use of drones to create 3D models, so yes.

13   A.   Yes, that's part of, you know, being --

14   creating good 3D models how to properly capture

15   the images, and for me personally that's been

16   through experience.

17   Q.   And is there any way to get -- take

18   classes on this?

19   A.   Well, that's one of the things that we

20   talk about in the DARTDrones mapping and modeling

21   class is we talk about how to properly capture

22   these images.

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```
 1        Q.   And so if I don't take the DARTDrones

 2   class and I don't have any experience under the

 3   charge of somebody who's got expertise in creating

 4   3D models, what's the downside?  What kind of errors

 5   can I -- can I create?

 6        A.   Well, one of the great things about 3D

 7   models is if you get it wrong, you really know

 8   that you've gotten it wrong.  It just looks wrong.

 9   So if you don't have the proper information,

10   you'll know, so -- and no client would be happy

11   with a poorly modeled 3D structure.  It would be

12   very evident that there was a problem.

13        Q.   There must be cases where it's not clearly

14   evident and yet the model itself is defective in

15   some way.  Is that true?

16        A.   That's possible.  That's the thing about

17   3D models, you can really tell a good 3D model

18   versus a bad 3D model.  It's pretty obvious.

19        Q.   And what are the uses of 3D models?  Why

20   would somebody hire you to generate a 3D model?

21        A.   There's a lot of reasons.  Visualization

22   might be one of them.  So they want a digital file
```

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 1   of something so that they can use it for marketing

 2   materials. They can use it for showing clients.

 3   State of a current situation, what's great about a

 4   3D model is you can move around it in space so

 5   it's not a static image. So you can look at it

 6   from multiple sides, right there looking at the

 7   model. So visualization definitely is one use of

 8   that. 3D models are, depending on their accuracy,

 9   measurable also. It's just an easy way to move

10   around an object and look at it more detailed than

11   a series of images. Just easier to navigate.

12   Q.   So let me, I guess, go back to the

13   beginning. I asked you what opinions you were going

14   to offer. And as I understand it, your job is to --

15   is to, I guess, educate the Court as to how unmanned

16   aerial systems collect and process information about

17   land and structures, correct?

18   A.   I guess you could put it that way.

19   Q.   I'm actually reading from your report.

20   So are you -- and then you're also giving

21   opinion on the different ways which drone-captured

22   data can provide useful information to clients,

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 1   correct?

 2   A.   Uh-huh, yes.

 3   Q.   So I want to kind of go through the use

 4   case that you put in here, which again, as I

 5   understand it, you're saying you're here to give an

 6   opinion on certain tools that can be used in

 7   mapping, photogrammetry, 3D imaging, correct?

 8   A.   Yes.

 9   Q.   Okay. And so you're the guy to explain to

10   the Court how the tool works, right?

11   A.   Yes.

12   Q.   And then how the tool -- either the drone

13   itself, the camera on the drone, or the software can

14   produce certain data for the clients, correct?

15   A.   Correct.

16   Q.   Okay. And so you have on your report, on

17   page 9, you have some use cases and I guess you're

18   probably just giving -- you're trying to give the

19   Court some examples, but it's certainly not

20   exhaustive of how this data can be used, right?

21   A.   Correct.

22   Q.   And then the first area that you have is

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1   bidding, planning, and design on page 9. Do you see

2   that?

3   A.   Yes.

4   Q.   And so walk me through that. What are you

5   talking about there? I know you're talking about

6   the construction process for developers. But what

7   are you talking about bidding, planning, and design?

8   A.   I believe the point of that was along the

9   lines of this information can be used before the

10   project starts, during the project, and once the

11   project is completed. And these are some of the

12   uses that a company might use before their project

13   starts. Visualization, like I mentioned in the

14   report, drainage point, elevations, things like

15   that, ways for companies to assess before a job

16   starts.

17   Q.   Okay. And so when we talk about the data

18   that's produced by the software using drones, it

19   sounds like what I hear you saying is, to the Court,

20   is that you have expertise in how to use these

21   tools, correct?

22   A.   Correct.

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```
 1        Q.   Okay.  And you're not an expert on land

 2   surveying, right?

 3        A.   Correct.

 4        Q.   Okay.  And you're not licensed as a land

 5   surveyor?

 6        A.   Correct.

 7        Q.   Okay.  And you're not an expert in the

 8   area of photogrammetry?

 9        A.   Correct.

10        Q.   Okay.  And then you have comparison over

11   time.  What is that?

12        A.   Well, this is one of those -- it's a use

13   for this kind of information.  Because using a

14   drone is very efficient and cost effective, you

15   can use it repeatedly over a period of time to

16   document changes on a worksite, how the site is

17   progressing, progress that's being made or not

18   being made.  It's a very good visual record of the

19   state of a job site, for example, at a given time.

20        Q.   And then the next section you have is easy

21   and repeated progress reports.  And what are we

22   talking about there?  Is that similar to comparison
```

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```
 1   over time?

 2        A.   Yes, that is similar.

 3        Q.   And then you have some pictures on

 4   page 10.  So give the client an idea of essentially

 5   taking images or pictures and here's what the

 6   project, their job site looks like on day 1, day 5,

 7   day 10, day 15, something along those lines?

 8        A.   Correct.

 9        Q.   Okay.  And inventory management is another

10   section where you have stockpile measurements of

11   construction materials and aggregates can be

12   conducted safely, quickly, and accurately with

13   unmanned aircraft?

14        A.   Yes.

15        Q.   This is going back to the volumetrics

16   issue?

17        A.   Correct, this is about volumetrics.

18        Q.   Then on page 11, you have visualizing

19   property, which I guess is somewhat similar to easy

20   and repeated progress reports, getting an idea what

21   the project looks like from above?

22        A.   Yeah.  I guess that's fair.
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 1        Q.   Okay.  And what are you -- when you wrote

 2   this section, visualizing property, what did you

 3   want to convey to the reader?

 4        A.   Well, this is slightly different than --

 5   I think the distinction was using in preplanning

 6   versus this is really more about 3D visualization,

 7   more specifically ways that areas, properties,

 8   things like that can be visualized in three

 9   dimension always.

10        Q.   And then the next section is safety and

11   accuracy.

12        A.   Uh-huh.

13        Q.   And you get into an example of a cell

14   tower, and you have a picture of that on page 12,

15   right?

16        A.   Correct.

17        Q.   Okay.  And you're given an example of how

18   a company, whether it be an owner of a cell tower,

19   it could be a tower engineering company, why they

20   might hire you to provide certain data?

21        A.   Correct.

22        Q.   Right?  Okay.  And why would that be?  Why
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 1   would a cell tower engineering company, for

 2   instance, why would they hire you to provide data?

 3   What are they -- what's one example that you

 4   reference in your report?

 5        A.    I referenced a tower that was deemed

 6   unclimbable and that was very costly to inspect

 7   with a crane or some other method, and the drone

 8   was a very cost effective way to inspect something

 9   that was difficult to inspect.

10        Q.    So it's a -- you're saying that you can

11   use drones and cameras and software to create data

12   so that these companies can do safety inspections of

13   cell towers?

14        A.    Not that they necessarily are doing

15   safety inspections, but that it's safer to fly a

16   drone to collect these images than to send a

17   person up and climb a tower to collect this

18   information because of the potential of them

19   falling.

20        Q.    And they're using this to inspect their

21   tower, right?

22        A.    They're using this to get information on
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 1   their tower. It can be inspection. It can be

 2   where to put a -- there's a number of ways to use

 3   the information.

 4   Q.   And what -- just as though there were a

 5   number of ways to use the information, there are a

 6   number of ways that erroneous information could

 7   adversely impact the client, meaning a cell tower

 8   engineering company or the owner of a cell tower,

 9   right?

10   A.   That's possible.

11   Q.   Okay. And so what would happen if the

12   cell tower got bad -- cell tower company got bad

13   data that they're using to inspect their cell tower,

14   what are some concerns that you might have?

15   A.   Well, it would depend on what the bad

16   data was and what they were looking for, but can

17   you give me a more specific question?

18   Q.   Well, I'm using your example. So your

19   hypothetical or your example to the Court is

20   inspection, you said: How can you inspect a cell

21   tower when it can't be climbed? And you're talking

22   about, hey, we could use this data to provide cell

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 1   tower companies information on doing a cell tower

 2   inspection.

 3           And my concern is, I'm asking it through a

 4   question, but the concern would be what happens if

 5   you're not really qualified to provide them this

 6   sort of data and you provide bad data?  You know, do

 7   you see some -- do you have concerns?  Or is that

 8   something that's really outside of your area as an

 9   expert and using certain tools in the field of

10   mapping and photogrammetry and surveying, et cetera?

11       A.   Well, using my -- the tools at my

12   disposal and relying on the accuracy report of

13   PIX4D and my experience, I would hope that the

14   information would be as accurate as possible.  If

15   it wasn't, it depends on what they're actually

16   looking for, if it's something structural, if it's

17   something -- bad data in any field is a problem.

18       Q.   I guess the question is:  How do you guard

19   against giving a client bad data?  You as a drone

20   operator, how do you guard against that?

21       A.   Like I said, I rely on my experience and

22   my tools, and I personally would not give
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 1   information I didn't feel comfortable that I could

 2   provide what they wanted. For example, on the

 3   fence example, if I was unable to use ground

 4   control points, I would tell you I can't tell you

 5   where to put your fence.

 6   Q.   Who would you tell them to hire?

 7   A.   You know, I would tell them -- it's not

 8   something that I could do is what I would tell

 9   them.

10   Q.   Would it make sense for them to hire a

11   land surveyor to figure out where to put their

12   fence?

13   A.   That's a possibility.

14   Q.   Then you have law enforcement. What were

15   you trying to convey to the reader when you wrote

16   your law enforcement section?

17   A.   Largely that public safety is also using

18   this information, and it's just another use for

19   that.

20   Q.   How many uses are there -- other than what

21   you noted for the Court in your report, how many

22   other uses are there for this kind of data that

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 1   would be generated by DroneDeploy or PIX4D?

 2   A.   It seems like people are finding

 3   applications for this all the time. So I can't

 4   tell you a number, but people are using this

 5   technology in a number of ways, and I outlined a

 6   few in my report.

 7   Q.   It would be difficult, right, or almost

 8   impossible for you to identify all the uses for this

 9   kind of information generated by DroneDeploy or

10   PIX4D; is that fair?

11   A.   There are a lot of uses for this, and I

12   did not include all of them in my report and I

13   don't know that I personally know of all the uses

14   for this technology.

15   Q.   All right. And so just sort of to close

16   the loop here, you were asked to provide information

17   to the Court on the use of drones, correct?

18   A.   Correct.

19   Q.   All right. And using a drone to take

20   pictures, right?

21   A.   Correct.

22   Q.   And the way you put it in your report,

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 1   using a drone and a related camera to collect data

 2   by taking pictures, correct?

 3   A.   Correct.

 4   Q.   And then using -- you're also here to

 5   educate the Court on using certain software to

 6   generate data files known as orthomosaic maps or 3D

 7   models?

 8   A.   Correct.

 9   Q.   Is that the scope of your report? Are

10   there any other information that we haven't

11   discussed?

12   A.   No, I believe that's the scope of the

13   report.

14   MR. HANNA: Okay. I appreciate your time.

15   Thank you. I don't have any further questions.

16   MR. GEDGE: Great. We may have a couple.

17   Maybe we can take 5 and circle back and we may

18   have a few.

19   MR. HANNA: That would be fine.

20   (A short break was taken.)

21   MR. GEDGE: We can go back on the record.

22   Plaintiffs don't have any questions for

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1   Alex at this time.

2   So I guess we can quickly just run

3   through ordering the transcript. We will take a

4   copy, electronic. I think Alex will read and sign

5   as well. So if we can facilitate that, that would

6   be great.

7   (Witness excused, 5:19 p.m.)

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 1    STATE OF ILLINOIS )
 2                      )  SS:
 3    COUNTY OF COOK    )
 4         I, RACHEL F. GARD, RPR, CLR, CRR, CSR No.
      084-3324, a Certified Shorthand Reporter in and for
 5    the State of Illinois, at large, do hereby certify
      that ALEX ABATIE, the deponent herein, was
 6    previously duly sworn to tell the truth, the whole
      truth, and nothing but the truth in the
 7    aforementioned matter;
           That the foregoing deposition was taken on
 8    behalf of the Defendants remotely via Zoom, on the
      11th day of November, 2021, at 3:00 p.m., pursuant
 9    to the applicable rules;
           That said deposition was taken down in
10    stenograph notes and afterwards reduced to
      typewriting under my direction, and that the
11    typewritten transcript is a true record of the
      testimony given by the said deponent; and that
12    signature was requested by the deponent and all
      parties present;
13         That the parties were represented by their
      counsel as aforementioned.
14         I do further certify that I am a disinterested
      person in this cause of action, that I am not a
15    relative or attorney of either party or otherwise
      interested in the event of this action, and that I
16    am not in the employ of the attorneys for any party.
           IN WITNESS WHEREOF, I have hereunto set my
17    hand and affixed my seal on this 2nd
      day of December, 2021.
18
19
20
21            Rachel F. Gard
22                COURT REPORTER
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